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CARDIOVASCULAR FLASHLIGHT

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Ultra-low-dose hybrid single photon emission computed tomography and coronary computed tomography angiography: a comprehensive and non-invasive diagnostic workup of suspected coronary artery disease

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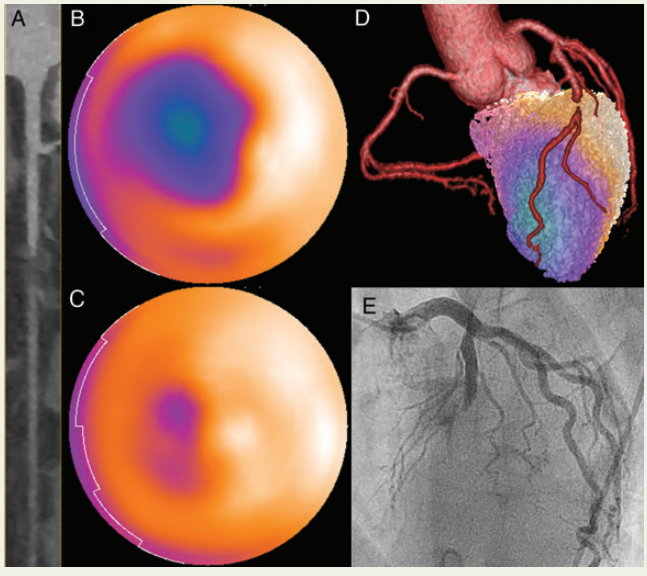

A 52-year-old male patient (body mass index: 23.5 kg/m^2) without known coronary artery disease (CAD) or any cardiovascular risk factors was referred for non-invasive evaluation due to typical angina. The initial computed tomography (CT) for coronary artery calcium scoring (CACS) showed no calcifications. Subsequently, coronary computed tomography angiography (CCTA) was performed using prospective electrocardiogram triggering on a latest generation 256-slice CT scanner (Revolution CT, GE Healthcare). Coronary computed tomography angiography revealed a non-calcified lesion with subtotal occlusion in the middle left anterior descending (LAD) coronary artery (*Panel A*). Adenosine stress and rest single photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI)—with administration of 143 and 276 Mbq ^{99m}Technetium-tetrofosmine for stress and rest imaging, respectively—was performed on a high-sensitive cadmium-zinc-telluride detector gamma camera (Discovery 530NMc, GE Healthcare) for assessment of ischaemia or scar (*Panel B* stress; *Panel C* rest). Hybrid SPECT/CCTA demonstrated a large reversible perfusion defect in the apical and anteroseptal myocardium, subtended by the LAD (*Panel D*). Invasive coronary angiography confirmed the morphological finding (*Panel E*), and the patient was successfully revascularized.

Cumulative effective radiation dose for cardiac hybrid imaging (CACS 0.66 mSv, CCTA 0.47 mSv, SPECT 2.8 mSv) resulted in 3.93 mSv and total amount of contrast agent used for CCTA was 30 mL.

While adding SPECT MPI to CCTA has been demonstrated to improve diagnostic accuracy, the possible risks of radiation exposure from hybrid SPECT/CCTA imaging have remained an issue of concern. This case illustrates the feasibility of a comprehensive morphological and functional diagnostic work-up by cardiac hybrid SPECT/CCTA imaging of a patient presenting with stable CAD at a cumulative radiation dose <4 mSv.

Supplementary material is available at *European Heart Journal* online.